

What is claimed is:

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1. An enhanced LM609 grafted antibody exhibiting selective binding affinity to $\alpha_v\beta_3$, or a functional fragment thereof, comprising a CDR selected from the group consisting of a V_H CDR2 referenced as SEQ ID NO:104; a V_H CDR3 referenced as SEQ ID NO:106; and a V_L CDR1 referenced as SEQ ID NO:110.

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2. The enhanced LM609 grafted antibody of claim 1, wherein said functional fragment is selected from the group consisting of Fv, Fab, F(ab)₂ and scFV.

3. An enhanced LM609 grafted antibody substantially the same as the enhanced LM609 grafted antibody of claim 1.

4. An enhanced LM609 grafted antibody exhibiting selective binding affinity to $\alpha_v\beta_3$, or a functional fragment thereof, comprising the V_H CDR1 referenced as SEQ ID NO:34; the V_H CDR2 referenced as SEQ ID NO:102; the V_H CDR3 referenced as SEQ ID NO:106; the V_L CDR1 referenced as SEQ ID NO:108; the V_L CDR2 referenced as SEQ ID NO:112; and the V_L CDR3 referenced as SEQ ID NO:90.

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5. The enhanced LM609 grafted antibody of claim 4, wherein said functional fragment is selected from the group consisting of Fv, Fab, F(ab)₂ and scFV.

25 6. An enhanced LM609 grafted antibody substantially the same as the enhanced LM609 grafted antibody of claim 4.

7. An enhanced LM609 grafted antibody exhibiting selective binding affinity to $\alpha_v\beta_3$, or a functional fragment thereof, comprising the V_H CDR1 referenced as SEQ ID NO:34; the V_H CDR2 referenced as SEQ ID NO:102; the V_H CDR3 referenced as SEQ ID NO:106; the V_L CDR1 referenced as SEQ ID NO:110; the V_L CDR2 referenced as SEQ ID NO:112; and the V_L CDR3 referenced as SEQ ID NO:90.

8. The enhanced LM609 grafted antibody of claim 7, wherein said functional fragment is selected from the group consisting of Fv, Fab, F(ab)₂ and scFV.

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9. An enhanced LM609 grafted antibody substantially the same as the enhanced LM609 grafted antibody of claim 7.

10. An enhanced LM609 grafted antibody exhibiting selective binding affinity to $\alpha_v\beta_3$, or a functional fragment thereof, comprising the V_H CDR1 referenced as SEQ ID NO:34; the V_H CDR2 referenced as SEQ ID NO:104; the V_H CDR3 referenced as SEQ ID NO:106; the V_L CDR1 referenced as SEQ ID NO:110; the V_L CDR2 referenced as SEQ ID NO:112; and the V_L CDR3 referenced as SEQ ID NO:90.

11. The enhanced LM609 grafted antibody of claim 10, wherein said functional fragment is selected from the group consisting of Fv, Fab, F(ab)₂ and scFV.

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12. An enhanced LM609 grafted antibody substantially the same as the enhanced LM609 grafted antibody of claim 10.

13. A nucleic acid molecule encoding the enhanced LM609 grafted antibody of claim 1.

14. The nucleic acid molecule of claim 13, wherein said nucleic acid molecule comprises a nucleotide
5 sequence selected from the group consisting of SEQ ID NO:103, SEQ ID NO:105, and SEQ ID NO:109.

15. A nucleic acid molecule encoding the enhanced LM609 grafted antibody of claim 4.

16. The nucleic acid molecule of claim 15,
10 wherein said nucleic acid molecule comprises the nucleotide sequence referenced as SEQ ID NO:33 encoding a V_H CDR1; the nucleotide sequence referenced as SEQ ID NO:101 encoding a V_H CDR2; the nucleotide sequence referenced as SEQ ID NO:105 encoding a V_H CDR3; the
15 nucleotide sequence referenced as SEQ ID NO:107 encoding a V_L CDR1; the nucleotide sequence referenced as SEQ ID NO:111 encoding a V_L CDR2; and the nucleotide sequence referenced as SEQ ID NO:89 encoding a V_L CDR3.

17. A nucleic acid molecule encoding the
20 enhanced LM609 grafted antibody of claim 7.

18. The nucleic acid molecule of claim 17, wherein said nucleic acid molecule comprises the nucleotide sequence referenced as SEQ ID NO:33 encoding a V_H CDR1; the nucleotide sequence referenced as SEQ ID
25 NO:101 encoding a V_H CDR2; the nucleotide sequence referenced as SEQ ID NO:105 encoding a V_H CDR3; the nucleotide sequence referenced as SEQ ID NO:109 encoding a V_L CDR1; the nucleotide sequence referenced as SEQ ID NO:111 encoding a V_L CDR2; and the nucleotide sequence
30 referenced as SEQ ID NO:89 encoding a V_L CDR3.

19. A nucleic acid molecule encoding the enhanced LM609 grafted antibody of claim 10.

20. The nucleic acid molecule of claim 19, wherein said nucleic acid molecule comprises the
5 nucleotide sequence referenced as SEQ ID NO:33 encoding a V_H CDR1; the nucleotide sequence referenced as SEQ ID NO:103 encoding a V_H CDR2; the nucleotide sequence referenced as SEQ ID NO:105 encoding a V_H CDR3; the nucleotide sequence referenced as SEQ ID NO:109 encoding
10 a V_L CDR1; the nucleotide sequence referenced as SEQ ID NO:111 encoding a V_L CDR2; and the nucleotide sequence referenced as SEQ ID NO:89 encoding a V_L CDR3.

21. A method of inhibiting a function of $\alpha_v\beta_3$, comprising contacting $\alpha_v\beta_3$ with the enhanced LM609 grafted
15 antibody of claim 1.

22. A method of inhibiting a function of $\alpha_v\beta_3$, comprising contacting $\alpha_v\beta_3$ with the enhanced LM609 grafted antibody of claim 4.

23. A method of inhibiting a function of $\alpha_v\beta_3$, comprising contacting $\alpha_v\beta_3$ with the enhanced LM609 grafted
20 antibody of claim 7.

24. A method of inhibiting a function of $\alpha_v\beta_3$, comprising contacting $\alpha_v\beta_3$ with the enhanced LM609 grafted antibody of claim 10.

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25. An antibody, or a functional fragment thereof, comprising a CDR selected from the group consisting of a V_H CDR2 referenced as SEQ ID NO:104; a V_H CDR3 referenced as SEQ ID NO:106; and a V_L CDR1 referenced

as SEQ ID NO:110, and exhibiting enhanced binding affinity to $\alpha_v\beta_3$ compared to LM609.

26. The antibody of claim 25, wherein said functional fragment is selected from the group consisting of Fv, Fab, F(ab)₂ and scFV.

27. An antibody, or functional fragment thereof, comprising the V_H CDR1 referenced as SEQ ID NO:34; a V_H CDR2 referenced as SEQ ID NO:102; a V_H CDR3 referenced as SEQ ID NO:106; a V_L CDR1 referenced as SEQ ID NO:108; a V_L CDR2 referenced as SEQ ID NO:112; and a V_L CDR3 referenced as SEQ ID NO:90, and exhibiting enhanced binding activity to $\alpha_v\beta_3$ compared to LM609.

28. The antibody of claim 27, wherein said functional fragment is selected from the group consisting of Fv, Fab, F(ab)₂ and scFV.

29. An antibody, or a functional fragment thereof, comprising a V_H CDR1 referenced as SEQ ID NO:34; a V_H CDR2 referenced as SEQ ID NO:102; a V_H CDR3 referenced as SEQ ID NO:106; a V_L CDR1 referenced as SEQ ID NO:110; a V_L CDR2 referenced as SEQ ID NO:112; and a V_L CDR3 referenced as SEQ ID NO:90, and exhibiting enhanced binding activity to $\alpha_v\beta_3$ compared to LM609.

30. The enhanced LM609 grafted antibody of claim 29, wherein said functional fragment is selected from the group consisting of Fv, Fab, F(ab)₂ and scFV.

31. An antibody, or a functional fragment thereof, comprising a V_H CDR1 referenced as SEQ ID NO:34; a V_H CDR2 referenced as SEQ ID NO:104; a V_H CDR3 referenced as SEQ ID NO:106; a V_L CDR1 referenced as SEQ ID NO:110; a V_L CDR2 referenced as SEQ ID NO:112; and a V_L CDR3 referenced as SEQ ID NO:90, and exhibiting enhanced binding activity to $\alpha_v\beta_3$ compared to LM609.

32. The enhanced LM609 grafted antibody of claim 30, wherein said functional fragment is selected from the group consisting of Fv, Fab, $F(ab)_2$ and scFV.

33. A nucleic acid molecule having a nucleotide sequence selected from the group of nucleotide sequences consisting of SEQ ID NO:33, SEQ ID NO:89, SEQ ID NO:101; SEQ ID NO:103, SEQ ID NO:105, SEQ ID NO:107, SEQ ID NO:109, and SEQ ID NO:111.

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